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双柱鼠科一新属在新疆的发现

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关键词 新疆准噶尔盆地 上渐新统 梳趾鼠超科 双柱鼠科

内容提要

本文记述了产自新疆准噶尔盆地上渐新统的双柱鼠科一新属——原双柱鼠属(*Prodistylomys*)。它具有一些较原始的特点,但代表不同于 *Distylomys* 的另一分支。它的颊齿是由下后方斜向前上方生长的。

中国科学院古脊椎动物与古人类研究所野外队于1982年夏在新疆准噶尔盆地进行考察时,在乌伦古河北岸,上渐新统索索泉组褐红色泥岩夹少许灰绿色砂岩层中,发现了大量的哺乳动物化石。其中有一枚下颌骨,代表梳趾鼠超科双柱鼠科一较原始新属。材料虽少,但它在新疆的发现不但扩大了双柱鼠科的分布范围,而且使我们对这一类动物与其他种类的关系有了进一步认识。与此同时,也使我们对它们的牙齿的形态特征和其生长方式有了新的了解。插图由胡惠清同志绘制,在此表示感谢!

一、系统描述

?梳趾鼠超科 ?Ctenodactyloidea Simpson, 1945

双柱鼠科 Distylomyidae Wang, 1988

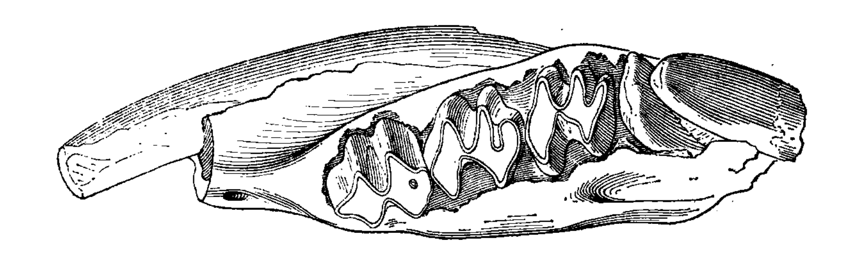
新疆原双柱鼠(新属、新种) ***Prodistylomys Xinjiangensis* gen. et sp. nov.**

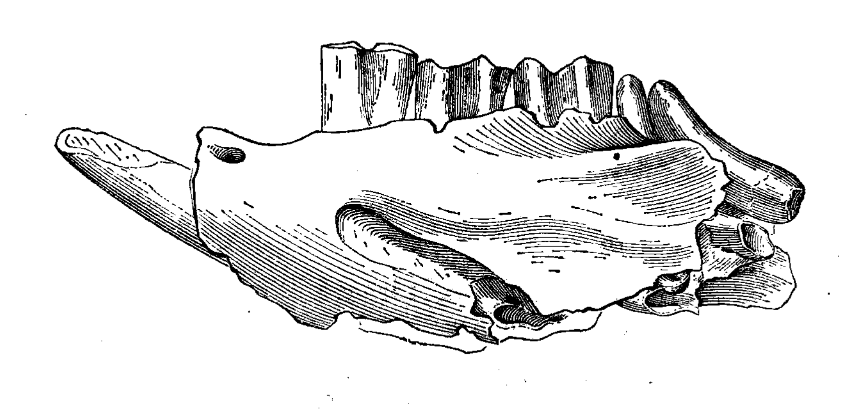
(图1)

正型标本 一段左下颌骨具 I_1 和 DP_4—M_3(中国科学院古脊椎动物与古人类研究所化石编号:V 7962)。

产地和层位 新疆准噶尔盆地乌伦古河北岸吃巴尔我义(中国科学院古脊椎动物与古人类研究所野外地点编号:82503);上渐新统,索索泉组。

鉴定特征 个体尺寸与 *Distylomys tedfordi* 相近,但较 *Distylomys* 原始的双柱鼠类。与 *Distylomys* 的区别在于:颊齿具齿根;DP_4 与 *Distylomys* 的 P_4 相似,但三角座较短,跟座较长,具下后坑和下后折;M_{1-2} 三角座为短而宽的平行四边形,跟座较三角座窄而长,约呈菱形;下后折很发育,在嚼面上伸达跟座中部,但往齿根部逐渐消失;下外





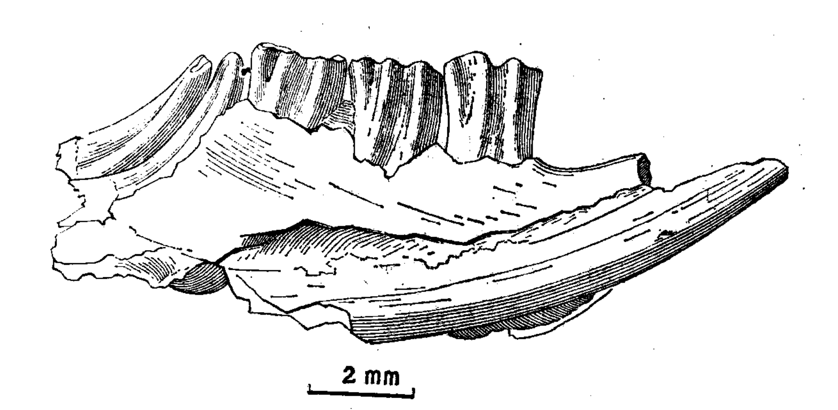


图 1　*Prodistylomys xinjiangensis* gen. et sp. nov.

正型标本 (Holotype)：左下颌骨，具 I_1 和 DP_4—M_3 (left lower jaw with I_1 and DP_4—M_3)，V7962 上 (upper)：冠面视 (crown view)；中(middle)：唇面视(labial view)；下 (lower)：舌面视 (lingual view)

折比下中折开阔，白垩质层薄。

名称来源　Pro + di + stylo + mys，(希)：原始＋双＋柱＋鼠，意思为较原始的双柱鼠；Xinjiang：新疆，为产化石的地区名称。

描述　下颌骨水平支下缘和垂直支已破损。下颌骨的形态与 *Distylomys* 的很相

似。下颌骨体唇面凸突，舌面纵向直，上下微凹。颏孔位于齿隙中部近上缘处。咬肌窝下咬肌嵴很发达，明显突出，从 DP_4 三角座下方斜着向下后方伸。无明显的上咬肌嵴等。

下门齿之末端初观似乎伸至 M_2 的下方，但由于颊齿齿根明显向后弯曲，实际上只伸达 M_1 齿根的舌侧(但下门齿末端稍有破损)。门齿横切面呈次长方形。珐琅质表面受腐蚀变粗糙，但无明显的纹饰。

颊齿齿冠很高，但具齿根，所有臼齿的齿根部都很短。颊齿齿冠形态与 *Distylomys* 的很相似，也是由两个多棱柱组成，三角座柱和跟座柱连接处很狭窄。

颊齿列中最前端的牙齿，从它的磨蚀程度较深，齿冠高度比其后的臼齿要低得多的特点分析，它可能是 DP_4，而不是 P_4。它的嚼面比后面的臼齿高出一些。它的形态特征与 *Distylomys* 的 P_4 很相似。三角座也约呈顶端浑圆的等边三角形，但较短，前唇缘和前舌缘均为凹的圆弧形。舌端锐、唇端钝。嚼面平，无任何尖或棱的结构。跟座较三角座宽，约呈菱形，前端和后端尖突，舌端前后压扁，较尖突，唇端较钝。下后边脊短。下后折浅。嚼面平滑，在其舌后侧靠近下后折处，有一圆形珐琅质环——下后坑，可能是下后折内端的残余。下后坑很浅。下中折和下外折彼此相对，都很深，约呈V形。从嚼面往齿根部 DP_4 齿冠长度稍变短，三角座柱前唇面由稍凹逐渐变圆凸。下中折和下外折都明显变浅，下外折在近根部处消失。两折中都有白垩质充填。跟座后舌面上部稍凹，往根部变平，下后折在嚼面稍下方很快消失。齿冠高约 2.79 毫米。

M_1 和 M_2 的三角座均约呈短而宽的平行四边形，前端浑圆，舌端前后明显压扁，唇端较钝。嚼面光滑无纹饰。跟座较三角座窄而长，约呈菱形。下后折很发达，伸达跟座中部。由于磨蚀程度不同，M_1 的下后折很浅，而 M_2 的较深。下中折和下后折都很深，均有白垩质充填。但下外折较下中折更开阔，约呈V形，而后者呈稍窄的U形。连接三角座和跟座的桥很狭窄，约位于齿的中轴处。从侧面看，M_1 和 M_2 都呈向后弯曲的弓形；齿冠在近嚼面处较直，往下则向后弯，其根部明显向后伸，分别伸达 M_2 和 M_3 嚼面的下方。齿冠长度在近嚼面处较长，往下到下颌骨齿槽缘附近明显变短，再往根部则长度变化不大。这可能和下后折的发育程度有关。下后折从牙齿嚼面往根部明显变窄，变浅，最后完全消失。在 M_1 仅在嚼面往齿冠内部伸入较深，往下明显变浅，在距嚼面约 0.6 毫米处往下则完全消失。而在 M_2 从嚼面往下到 0.6 毫米处很深，然后再往下突然变浅，并逐渐消失。下中折和下外折的深度和宽度都变化不大。

M_3 刚萌出，嚼面仅稍磨蚀。无明显的尖和棱结构。三角座嚼面约呈前后压扁的穹窿状，中部稍低较窄。跟座嚼面约呈顶端向前的三角形，不但比三角座窄，而且低很多，两者嚼面在刚萌出时彼此并不相连，只是在磨蚀到一定的阶段后才相连。跟座嚼面上有一新月形的磨蚀面，无任何尖、棱或下后折的痕迹。从侧面看，三角座柱和跟座柱也呈向后弯的弓形。与 M_1 和 M_2 不同在于，它的长度以及三角座和跟座的宽度从齿冠顶部往齿根部都明显地增加。下中折和下外折也加宽。其中未见白垩质覆盖。

比较 Distylomyidae 是 1988 年根据内蒙古的材料建立的新科，它包括一个新属 *Distylomys* 的两个新种：*D. tedfordi* 和 *D. qianlishanensis*，并暂时被归入 Ctenodactyloidea 超科。

由前面的描述可以看出，V 7962 的下颌骨和颊齿的基本形态特征都与 *Distylomys*

表 1 *Prodistylomys xinjiangensis* gen. et sp. nov. 正型标本 V 7962 颊齿测量(单位：毫米)

		DP₄—M₃	M₁—M₃	I₁	DP₄	M₁	M₂	M₃
长 (L.)		6.72	4.8	1.3	1.89	1.72	1.56	0.98[1)]
宽 (W)	三角座(trid)			1.2	1.15	1.64	1.72	1.31[1)]
	跟座 (tad)				1.39	1.56	1.39	0.98[1)]

1) M_3 为在未磨蚀的情况下的嚼面测量，实际上牙齿尺寸要大得多。

的是一致的。它的尺寸也与 *Distylomys tedfordi* 的相近。所不同的是 V 7962 的颊齿具齿根。此外，它的臼齿三角座前后明显缩短，横向加宽呈平行四边形，而跟座则相反，比三角座要长而窄，呈菱形。M_{1-2} 均具发达的下次折，下外折比下中折开阔，白垩质层薄等特点也与 *Distylomys* 的不同。V 7962 显然代表不同于 *Distylomys* 的新属—原双柱鼠属 (*Prodistylomys*)。

二、讨　论

1. 关于 *Prodistylomys* 的颊齿生长方式

关于 DP_4 的替换。V 7962 标本颊齿列中最前面的牙齿磨蚀程度显然比 M_1 和所有的臼齿都深，下后折几乎消失，其内端在嚼面上仅残留为珐琅质环。齿冠高度也比 M_1 及其后的臼齿低许多。显然它萌出的时间要比 M_1 等臼齿要早，很可能它是乳齿 DP_4，而不是恒齿 P_4。但需要指出的是 V 7962 标本中 M_3 已萌出，并有稍稍被磨蚀的痕迹，而 DP_4 仍保留在齿槽中，而且其齿冠的高度仍达 2.79 毫米左右，明显大于齿冠长度。当然，我们也注意到它的嚼面要比 M_1 的高些，而且在下颌骨内 DP_4 的下方还有空隙。可惜的是下颌骨的下缘已大部分破损，是否活着时确有恒齿 P_4 存在，或者 DP_4 正处于被 P^4 替换阶段，这些问题都不能肯定给予答复。但这一现象至少说明，如果 DP_4 不是终生存在，而是要被 P_4 替换的话，替换时间也很晚，最早也只能在 M_3 萌出，并经过一段时间磨蚀后。此外，如果 *Prodistylomys* 颊齿列中最前面的牙齿是 DP_4 的话，它的形态与 *Distylomys* 的 P_4 很相似，这表明 Distylomyidae 的 DP_4 和 P_4 一样，的确是臼齿化的。

关于臼齿的生长方式。*Prodistylomys* 的颊齿虽仍具齿根，但 V 7962 标本上的齿根都很短，而齿冠已相当高了。有趣的是，它的臼齿的齿冠都明显地向后，并稍向外弯曲。这表明 *Prodistylomys* 的颊齿已有向完全高冠齿方向发展的强烈趋势。*Prodistylomys* 似乎在利用臼齿齿冠弯曲的形式尽可能地增加颊齿齿冠的高度，而不特别增加下颌骨的高度。下颌骨的加厚和明显的外凸内凹的特点显然也是与颊齿向外弯，而下门齿位置内移有关。此外，刚刚萌出的 M_3 的三角座嚼面明显高于跟座的嚼面。联系到所有的臼齿都强烈地向后弯，更确切地说是它们的齿根向后伸的特点，这似乎表明 *Prodistylomys* 的臼齿的生长方式比较特殊。也就是说，它们不是直接由下往上生长的，而很可能是由下后方

斜向前上方生长的。这样 *Prodistylomys* 的下臼齿又以渐次向前推进的独特的生长方式，在不特别增加下颌骨高度的情况下，达到增加齿冠高度，以增加颊齿磨蚀时间。显然，这些特点对草食性动物是有利的适应。

如果关于 *Prodistylomys* 的下臼齿的生长方式的分析是合理的话，DP_4 似乎也有不被恒齿 P_4 替换的可能性。由此推论，*Distylomys* 的 P_4 是真正的 P_4、还是 DP_4 似乎也值得怀疑了。

2. 关于 *Prodistylomys* 和 *Distylomys* 的系统关系

由前面的描述和比较可以看出，与 *Distylomys* 比较，*Prodistylomys* 的确具有许多较原始的特征，似乎代表较 *Distylomys* 原始的属。那么，*Prodistylomys* 与 *Distylomys* 究竟是什么关系？*Prodistylomys* 是否有可能是 *Distylomys* 的直接祖先类型？ 下面我们将从两方面来分析这个问题。

首先从产化石的地层层位和时代看。*Prodistylomys* 产自索索泉组。其共生哺乳动物化石有 *Sinolagomys* sp. nov.（童，待刊）和 *Tachyoryctoides* sp. 等。童永生等(待刊)认为索索泉组的化石"与甘肃晚渐新世党河动物群相似，似乎相应种类略显进步。"其时代为晚渐新世。索索泉组之上被哈拉玛盖组所覆盖。而哈拉玛盖组所产哺乳动物化石中大部分种、属都与通古尔动物群的一致，认为其时代不会超过中中新统通古尔期。而 *Distylomys tedfordi* 正好产于通古尔地区中中新统通古尔组。从产出地层层序和时代看，*Prodistylomys* 比 *Distylomys tedfordi* 原始是合理的，有成为后者的祖先的可能性。但是 *Distylomys qianlishanensis* 不但比 *Prodistylomys* 进步，而且在某些特点上显得比 *Distylomys tedfordi* 还进步。然而其产出的地层伊克布拉格组的时代无疑为晚渐新世。与 *Prodistylomys* 产出的地层时代大致相当。从地层层序和时代看，*Prodistylomys* 产出的时代太晚，不可能是 *Distylomys* 的直接祖先类型。

其次，也是最重要的，是它们的颊齿特征。*Distylomys tedfordi* 和 *D. qianlishanensis* 具有一些不同于 *Prodistylomys* 的近裔共性，如颊齿无齿根，臼齿的三角座和跟座均约为三角形，彼此尺寸相近等。而 *Prodistylomys* 属除了具有许多原始特征外，也还具有一些近裔自性，如下三角座前后方向明显压扁变短宽，较下跟座既宽又短。因此，*Prodistylomys* 不但不可能是 *Distylomys qianlishanensis* 的直接祖先类型，而且也不可能是 *D. tedfordi* 的。*Prodistylomys* 和 *Distylomys* 不是祖先和后裔关系，而是代表不同的支系。它们分开的时间最晚也至少在中渐新世或更早。

3. 关于 Distylomyidae 与 Ctenodactyloidea 中其他各科的关系

我们在将 *Distylomys* 与 Ctenodactyloidea 各已知科进行比较讨论时曾指出（王，1988，P. 40—41）：*Distylomys* 的下颌骨和颊齿的一些特点与某些 ctenodactylids 的相似，而与 chapattimyids 和 yuomyids 的不同。而它的 P_4 臼齿化的特点又与后两科的一致，而与前者不同。由于考虑到臼齿化的 P_4 代表啮齿类的一种原始特征，而 Ctenodactylidae 具非臼齿化 P_4 这一进步特征，Ctenodactylidae 则以此特点与具臼齿化 P_4 的 Distylomyidae，以及 Chapattimyidae 和 Yuomyidae 分开。这样 Distylomyidae 与

Ctenodactylidae 在下颌骨和颊齿上的相似则被认为是平行进化的结果。 *Prodistylomys* 的特点似乎也进一步证明了这一点。尽管 *Prodistylomys* 的 M_1 和 M_2 都具有发达的下后折，但 M_3 的跟座较小，而且没有任何下后折的痕迹。此外，它的 M_2 也不大于 M_1。这些特点都与 Ctenodactylidae 的不同，并显示出两者各自向不同方向发展的趋势。这也进一步证明了它们可能从较基部就分开了。另外，虽然根据 P_4 臼齿化的特点考虑 Distylomyidae 可能与 Chapattimyidae—Yuomyidae 组成姐妹组。但这一特征毕竟是原始特征。加之 Chapattimyidae—Yuomyidae 在下颌骨和颊齿上都保持了许多原始特征，而 Distylomyidae 获得了许多特化特征，彼此相差较远。因此，如果暂时仍将 Distylomyidae 保留在 Ctenodactyloidea 的话，它显然也代表偏离较远的独立支系。

（1988 年 7 月 16 日收稿）

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PRODISTYLOMYS GEN. NOV. (DISTYLOMYIDAE, ?CTENODACTYLOIDEA, RODENTIA) FROM XINJIANG, CHINA

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Key words Junggar Basin, Xinjiang; Upper Oligocene; Distylomyidae, Ctenondactyloidea

Abstract

A lot of fossil mammals were collected from Suosuoquan Formation at the northern edge of Junggar Basin, Xinjiang Uygur Autonomous Region, China, by the staffs of a field team of IVPP during the summer field season of 1982. Among them a left lower jaw representing a new genus, *Prodistylomys*, is recognized and described in this paper. The new one is quite different from the genus *Distylomys*, in the Family Distylomyidae. The discovery of it not only extends the distribution of Distylomyidae, but also reveals some primitive features. Meanwhile, it throws some light on the tooth grow way and the relationship between Distylomyidae and other ctenodactyloids.

SYSTEMATICS

?Ctenodactyloidea Simpson, 1945

Distylomyidae Wang, 1988

Prodistylomys xinjiangensis gen. et. sp. nov.

Holotype A fragmental lower jaw with I_1 and DP_4—M_3 (IVPP: V 7962).

Locality and horizon IVPP: Loc. 82503, Chibaerwoyi, the north bank of the Ulungur River, Junggar Basin, Xinjiang, China; Upper Oligocene, Suosuoquan Formation.

Diagnosis A more primitive distylomyid close to *Distylomys tedfordi* in size. Differs from *Distylomys* in following featutes: cheek teeth rooted; DP_4 with metaflexid and metafossetid, and shorter trigonid and talonid; molars trigonid short and wide rhombus in form and talonid lozenge formed, longer and narrower than trigonid; M_{1-2} with developed metaflexid and thin cement in ectoflexid and mesoflexid.

Etymology Pro+di+stylo+mys, Greek, meaning a primitive distylomyid. Xinjiang, the name of the region where the fossil was collected.

Description and comparison: V 7962 is similar to *Distylomys* in some main features of the lower jaw and the cheek teeth. It is close to *D. tedfordi* in size. DP_4 is similar to P_4 of *Distylomys* in shape and structure, but with shorter trigonid and talonid, and the metaflexid and the circular vestage of the metafossetid. The well developed ectoflexid and mesoflexid shallow towards the root. The crown surface is higher than those of the molars.

The molars have great curvature of the vertical axes, both posteriorly and labially. The-

refore, the root of M_1 extends below M_2, and that of M_2 below M_3.

M_1 and M_2 are about the same in size and shape. The trigonid, being wide and short rhombus-shaped, is wider and shorter than the talonid which is lozenge-shaped. Well developed mesoflexid and ectoflexid are opposite to each other, and covered by thin cement at the bottom. The metaflexid is also very developed and extends to the middle of the talonid in the recent wear stage. It is more shallow on M_1 than on M_2. It seems that it gets shallow gradually and, at last, disappears with wear. Therefore, M_1 and M_2 slightly shorten in lenth towards the root.

M_3 has just erupted. The crown surface without any cusp and crest structure has just begun to be worn. The trigonid is of vault compressed antero-posteriorly and with slightly narrow and low top. The talonid is triangular in shape with lunar wear facet on it. The top is lower and narrower than that of the trigonid and does not join the latter until they are worn out sometime. In both lenth and width M_3 increases from the top to the root.

In short, In V 7962 the hypsodont cheek teeth have roots. The trigonid is wider and shorter than the talonid. The metaflexid is well developed on M_{1-2} but disappears gradually with wear. The cement in the mesoflexid and metaflexid is thin etc. All these features are quite different from those of *Distylomys*. It seems that it represents a distinct genus. We call it *prodistylomys*.

DISCUSSION

1. The grow way of the cheek teeth

The cheek teeth of *Prodistylomys* reveals some special grow way.

First is about DP_4. The first one of the cheek teeth is heavily worn and much shorter than the molars in crown height. The metaflexid only remains vestage. It appears to be DP_4 rather than P_4. As mentioned above, the crown surface is slightly higher than those of the molars. We do not know whether it is being replaced by P_4. There seems a hole under DP_4 in the mandible. We wonder if there exists a germ of P_4 in it during the lifetime, because the lower part of the mandible is broken. Anyway, it suggests, at least, that DP_4 of *Prodistylomys* is not replaced until M_3 erupts and begins to be worn, even if it does. Otherwise, ifit is true that the first tooth of the lower cheek teeth of *Prodistylomys*, molariformed just like P_4 of *Diustylomys*, is DP_4, it may prove that DP_4 of *Prodistylomys* is also molariformed as the other ctenodactyloids.

Second, it is interesting to point out that all lower molars of *Prodistylomys* have great curvature of the vertical axes, both posteriorly and labially. The roots extend downward and backward. Furthermore, the crown surface of the trigonid of M_3 is higher than that of the talonid. It seems that the lower molars grow forward and upward rather than upward only. Therefore, the lower jaw of *Prodistylomys* can hold much high crown cheek teeth without deeping the height of the mandible not only by the curvature of the teeth vertical axes, but also by the special grow way.

2. The relationships between *Prodistylomys* and *Distylomys*

As pointed out above, *Prodistylomys* is more primitive than *Distylomys* in some teeth features. However, it does not mean that *Prodistylomys* is the ancestor type of *Distylomys*. First, Tong and all (in press) have pointed out that the Suosuoquan Formation yielding *Prodistylomys* is of Late Oligocene because the fauna including *Sinolagomys* sp. nov. (Tong, in press) and *Tachyoryctoides* sp. is similar to the Late Oligocene Taben-buluk fauna in Gansu Province. The

Suosuoquan Formation is overlied by the Halamagai Formatoion which is considered to be of Middle Miocene Tunggurian stage. Although no distylomyid has been found in Halamagai Formation so far, *Distylomys tedfordi* has been collected from Tunggur Formation. Therefore, it seems reasonable to consider *Prodistylomys* the ancestor of *D. tedfordi* based on the age. However, the other species, *Distylomys qianlishanensis*, was collected from Upper Oligocene Yikebulag Formation. It means that both *Prodistylomys* and *Distylomys qianlishanensis* are of the same age——Late Oligocene. According to the age, *Prodistylomys* is too late to be ancestor of *Distylomys*. Second, the most important, is that *Distylomys tedfordi* and *D. qianlishanensis* share some derived characters (synapomorphy), for example, complete hypsodont rootless cheek teeth, triangular trigonid and talonid etc. Meanwhile, basides some primitive characters, *Prodistylonmys* also has some derived characters (autapomorphy), such as short and wide rhomboid trigonid etc. As far as the characteristics are concerned, it appears that *Prodistylomys* represents a distinct lineage fron *Distylomys* rather than the ancestor of the latter. The time they split from each other might be, at least, in the Middle Oligocene or even earlier.

3. The relationships between Distylomyidae and other ctenodactyloids

Discussing the phylogenetic status of *Distylomys*, Wang (1988) has pointed out that *Distylomys* resembles some ctenodactyloids, but differs from the chapattimyids and yuomyids in the mandible and tooth characters, while in the molariform P_4 it is similar to the latter not to the former. Based on the molariform P_4, Distylomyidae has been thouglit belonging to the sister group of Chapattimyidae-Yuomyidae rather than the Ctenodactylidae with non-molariform P_4. The similarities between the Distylomyidae and Ctenodactylidae were consisdered the result of parallel evolution. The characters of *Prodistylomys* give some new evidences for that, such as the talonid of M_3 is much small and has no any vestage of the metaflexid and M_2 is not larger than M_1 in size. All these characters show that *Prodistylomys* has a distinct tendence from the Ctenodactylidae indeed. On the other hand, the only common character of the Distylomyidae and the Chapattimyidae-Yuomyidae is molariform P_4. The other characters, both in mandible and cheek teeth, are quite differens between them. However, the molariform P_4 is a primitive character for the rodents. It means that they have symplesiomorphy and compose a paraphyletic group. Therefore, Distylomyidae represents a distinct lineage from other ctenodactyloids, even if it belongs to this superfamily.